RAILROADS

DELIVER THE GOODS!

RANDY DAVIS IS STARTING OUT AS A RAILROADMAN, LEARNING TO BE A BRAKEMAN. HIS FIRST RUN IS WITH HIS FATHER, CONDUCTOR ON A FREIGHT TRAIN.

WELL, SON, YOU'VE BEEN ASSIGNED TO MY RUN TOMORROW TO BEGIN YOUR STUDENT-BRAKEMAN INSTRUCTION. YOU'LL MAKE THREE TO TEN TRIPS.

SAY, DAD, THAT'S SWELL! I'M ALL SET TO START.

WHAT HAVE WE GOT ON THE HEAD-END?

TWO UNITS— AN "A" AND A "B." ED SMITH IS OUR ENGINEER.

EARLY NEXT MORNING IN THE YARD, THEIR TRAIN — No. 70, A FAST FREIGHT — IS ALREADY MADE UP ON THE OUT-BOUND TRACK.

HI, CAP. HELLO, RANDY. ARE YOU GOING WITH US TODAY?

720

I SURE AM, MR. SMITH. GOING TO START LEARNING THE JOB.

YES, ED. I'M BREAKING IN A NEW MAN.

HAULING FREIGHT IS THE RAILROADS' BIGGEST JOB. RAILROADS ARE EQUIPPED TO MOVE ANYTHING, IN ANY QUANTITY, FOR ANYBODY, IN ANY SEASON OF THE YEAR, IN ANY PART OF THE CONTINENT.

BY MEANS OF A STANDARD GAUGE (WIDTH OF TRACK) AND AN INTERCHANGE OF CARS, ANY CAR OF ANY AMERICAN RAILROAD MAY BE SENT ANYWHERE IN THE UNITED STATES, CANADA, MEXICO, AND CUBA IN A TRULY CONTINENTAL SYSTEM OF TRANSPORTATION. ALL CARS COUPLE TOGETHER, BRAKE TOGETHER, AND RUN TOGETHER. EVEN THE LADDERS, STEPS, AND HAND BRAKES ARE ALWAYS IN THE SAME PLACES. THERE IS A STANDARD CODE OF OPERATING RULES.

COUNTING **TONS MOVED ONE MILE**, OR **TON-MILES**, UNITED STATES RAILROADS CARRY ALMOST AS MUCH FREIGHT BETWEEN CITIES AS ALL THE TRUCKS, ALL THE BARGES, ALL THE LAKE BOATS, ALL THE PIPELINES, AND ALL THE AIRPLANES COMBINED.

PRINTED IN U.S.A.

AFTER CONDUCTOR AND ENGINEER COMPARE WATCHES, RANDY AND HIS FATHER WALK BACK TO THE CABOOSE. CAR INSPECTORS EXAMINE THE CARS TO MAKE SURE THEY ARE IN GOOD ORDER.

I SEE THAT THE MARKERS ARE UP ON THE CABOOSE — THAT MAKES IT A TRAIN. HOW LONG BEFORE WE START?

IN A FEW MINUTES. FIRST, I'VE GOT TO SIGNAL THE ENGINEER TO TRY THE AIR BRAKES.

657

COME ON IN, BOY, AND MAKE YOURSELF AT HOME. I'M RED DOLAN, THE REAR BRAKEMAN. YOUR DAD'S SIGNALING "AIR BRAKES O.K." WE'RE READY TO ROLL FROM HERE ON.

657

CONDUCTOR DAVIS GIVES THE ENGINEER THE "HIGHBALL." No. 70 WITH 49 LOADS AND 11 EMPTIES BEGINS TO MOVE.

THE TRAIN GETS THE CLEAR SIGNAL AT THE YARD EXIT AND IS SOON ROLLING UP THE MAINLINE BEHIND A TWO-UNIT DIESEL-ELECTRIC LOCOMOTIVE.

RANDY, YOU GO UP IN THE CUPOLA WITH RED — HELP HIM KEEP AN EYE ON THE TRAIN. I'VE GOT TO DO MY OFFICE WORK — CHECK WAYBILLS AND KEEP MY WHEEL REPORT. THAT'S A LISTING OF CARS ON THE TRAIN — OWNERSHIP, ORIGIN, WEIGHT, CONTENTS, DESTINATION.

UP AT THE "HEAD-END," THE ENGINE CREW WATCHES THE TRACK AHEAD.

CLEAR BOARD!

THE DISPATCHER MUST BE GOING TO "PUT US IN THE HOLE" AT ROUND ROCK JUNCTION.

MEANWHILE, AT A CENTRALIZED TRAFFIC CONTROL PANEL MANY MILES AWAY...

...LIGHTS ON THE BOARD INDICATE THAT NORTHBOUND No. 70 AND SOUTHBOUND No. 29 ARE APPROACHING EACH OTHER. THE DISPATCHER MOVES LITTLE LEVERS AND PUSHES BUTTONS, SETTING SIGNALS AND SWITCHES SO THAT THE NORTHBOUND TRAIN GOES ONTO A PASSING TRACK. A FEW MINUTES LATER, THE SOUTH-BOUND FREIGHT ROARS BY ON THE MAINLINE TRACK.

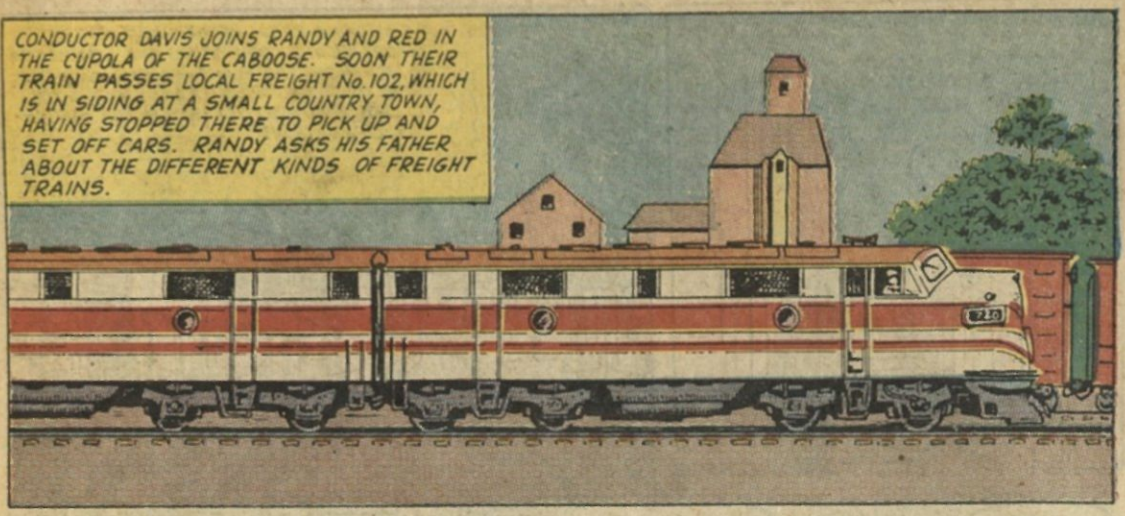
THAT WAS A FAST "MEET." WE DIDN'T EVEN HAVE TO STOP ROLLING TO LET THE OTHER TRAIN PASS.

RIGHT. "C.T.C." REDUCES DELAYS AND SAVES A LOT OF STOPS FOR US.

SINCE WE CAME OFF THE PASSING TRACK AND ONTO THE MAINLINE AGAIN, WE'VE REALLY BEEN PICKING UP SPEED.

YES, WE'VE GOT A STRAIGHTAWAY RUN RIGHT INTO FLACKS MILLS. LOCAL FREIGHT 102'S UP THE LINE SOMEWHERE, BUT THEY'LL CLEAR US.

CONDUCTOR DAVIS JOINS RANDY AND RED IN THE CUPOLA OF THE CABOOSE. SOON THEIR TRAIN PASSES LOCAL FREIGHT No. 102, WHICH IS IN SIDING AT A SMALL COUNTRY TOWN, HAVING STOPPED THERE TO PICK UP AND SET OFF CARS. RANDY ASKS HIS FATHER ABOUT THE DIFFERENT KINDS OF FREIGHT TRAINS.



"LOCAL FREIGHTS STOP AT ALL STATIONS AND SIDINGS BETWEEN TERMINALS. TIME FREIGHTS STOP AT LARGER TOWNS. DISPATCH FREIGHTS CARRY PERISHABLES AND OTHER SHIPMENTS THAT REQUIRE REGULAR MOVEMENTS ON FAST SCHEDULES. MERCHANDISE FREIGHTS ALSO RUN ON FAST SCHEDULES. THEY HANDLE LESS-THAN-CARLOAD-LOT SHIPMENTS."

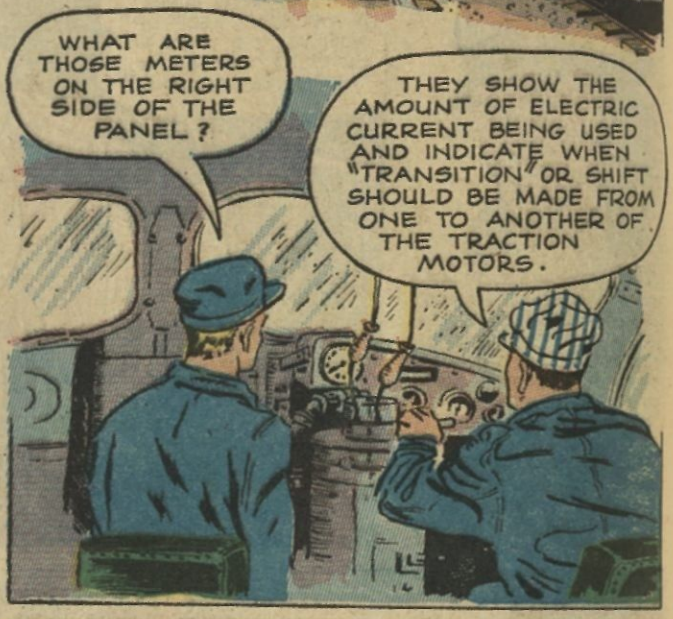
SAY, DAD, HOW DOES A RAILROAD KEEP UP WITH ALL ITS CARS? HOW DO THEY KNOW WHERE THEY ALL ARE?
EVERY RAILROAD HAS A CAR RECORD OFFICE WHICH KEEPS A RECORD OF EACH CAR. THROUGH TELEGRAPHED AND WRITTEN REPORTS AND A CAR'S WAYBILLS, THESE OFFICES CAN LOCATE A CAR AT ANY TIME. WAYBILLS SHOW THE CAR NUMBER, WHAT'S INSIDE, AND WHERE THE FREIGHT IS TO GO.

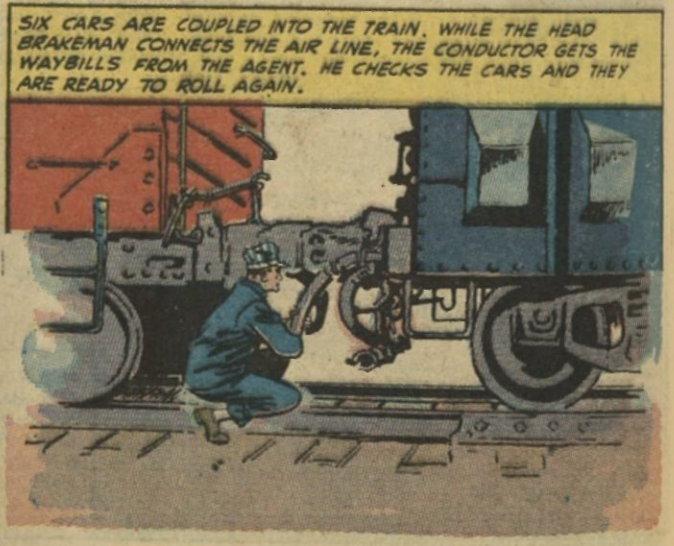
HE'S HIGHBALLING A LONG TRAIN OF BOX CARS. ARE THEY ALL FILLED WITH MERCHANDISE, DAD?
MOST OF THEM ARE PACKAGE CARS CARRYING L.C.L. FREIGHT -- LESS-THAN-CARLOAD — A LOT OF IT HANDLED BY "PICK-UP AND DELIVERY" AT THE FREIGHT STATIONS.
5

MILLIONS OF L.C.L. SHIPMENTS MOVE OVER U.S. RAILROADS. MANY RAILROADS PROVIDE PICK-UP AND DELIVERY SERVICE FOR FREIGHT, ALSO TRAILER-ON-FLAT CAR, OR "PIGGYBACK" SERVICE, THUS EXTENDING FREIGHT SERVICE TO THE DOORS OF MERCHANTS, MANUFACTURERS AND OTHERS.

A SWITCHING CREW IS ON HAND AT THE FACTORY SIDING. THEY MOVE THE LOADS FOR NO. 70 FROM THE PLANT TRACKS AND CUT THEM INTO THE TRAIN. RANDY GOES UP TO THE HEAD-END TO WATCH THE SWITCHING OPERATIONS.

MR. SMITH TOLD ME I COULD COME UP IN THE CAB.
OKAY. YOU CAN STAY ON THE ENGINE TILL THEY GET THROUGH SWITCHING. I'VE GOT TO CHECK THE TRAIN AND SUPERVISE THIS PICK-UP. WATCH YOUR STEP.


WHAT ARE THOSE METERS ON THE RIGHT SIDE OF THE PANEL?
THEY SHOW THE AMOUNT OF ELECTRIC CURRENT BEING USED AND INDICATE WHEN "TRANSITION" OR SHIFT SHOULD BE MADE FROM ONE TO ANOTHER OF THE TRACTION MOTORS.

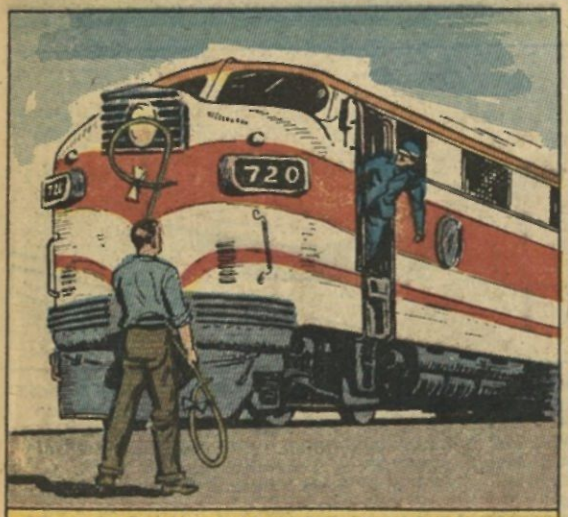

SIX CARS ARE COUPLED INTO THE TRAIN. WHILE THE HEAD BRAKEMAN CONNECTS THE AIR LINE, THE CONDUCTOR GETS THE WAYBILLS FROM THE AGENT. HE CHECKS THE CARS AND THEY ARE READY TO ROLL AGAIN.

THE CAB OF A LOCOMOTIVE CONTAINS THE CONTROLS REQUIRED IN THE OPERATION OF THE ENGINE AND TRAIN - THE THROTTLE, THE AIR BRAKE CONTROLS, THE SAND CONTROLS, AND SEVERAL GAUGES AND INDICATORS WHICH TELL THE ENGINEER HOW WELL THE LOCOMOTIVE IS PERFORMING. THE THROTTLE IS ON A CONTROL STAND TO THE LEFT OF THE ENGINEER'S SEAT (ON THE RIGHT SIDE OF THE CAB). BELOW THE THROTTLE IS THE REVERSE LEVER. ON THE INSTRUMENT PANEL IN FRONT OF THE CONTROL STAND IS THE SPEED RECORDER. THE AUTOMATIC BRAKE VALVE IS CLOSE TO THE ENGINEER'S RIGHT HAND.

NO. 70 NOW HAULING 55 LOADED CARS AND 11 EMPTIES, SPEEDS UP THE DOUBLE-TRACKED MAIN-LINE. DURING THE RUN, THE HEAD-END BRAKE-MAN RIDES IN THE ENGINE CAB TO KEEP SAFETY WATCH OVER HEAD-END CARS.

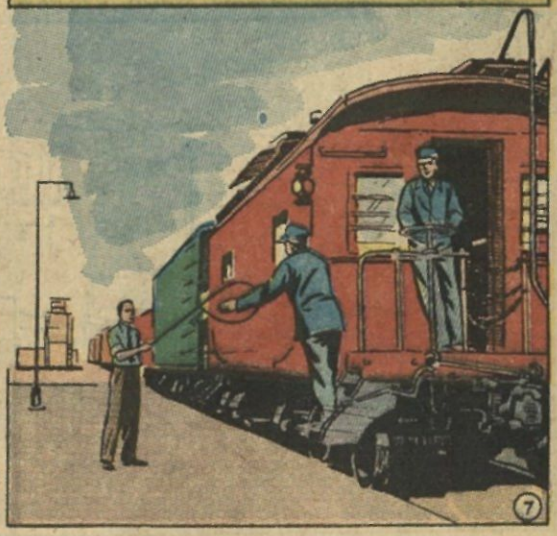
WE'LL PICK UP TRAIN ORDERS PRETTY SOON BECAUSE WE'RE LEAVING C.T.C. territory. WE WATCH THE ORDER BOARDS AT STATIONS AND TOWERS.

ANOTHER TRAIN RACES BY ON THE SOUTHBOUND TRACK — A SOLID TRAIN OF "REEFERS" (REFRIGERATOR CARS) — RUSHING FRESH MEATS, BUTTER, EGGS, FRUITS, AND VEGETABLES TO MARKET. IN A YEAR, U.S. RAILROADS HAUL MILLIONS OF TONS OF FARM PRODUCTS, ANIMALS, AND ANIMAL PRODUCTS.



AS No. 70 PASSES THE NEXT STATION, THE OPERATOR "HANDS UP" ORDERS ON LARGE WOODEN HOOPS. A MEMBER OF THE ENGINE CREW CATCHES ONE HOOP...

... AND CONDUCTOR DAVIS, STANDING ON THE CABOOSE STEPS, GRABS THE SECOND HOOP "ON THE FLY."

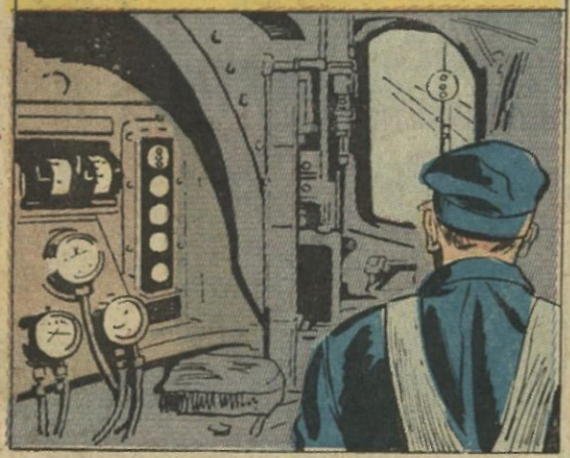


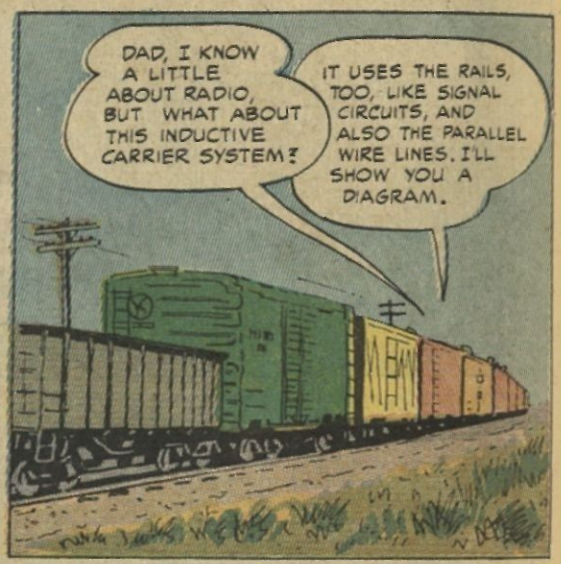
"SIGNALS AND COMMUNICATIONS ARE THE EYES AND EARS OF THE RAILROAD. MANY KINDS ARE USED — EVERYTHING FROM SIMPLE HAND, FLAG AND LANTERN SIGNALS TO AUTOMATIC ELECTRONIC CONTROL. MESSAGES ARE GIVEN BY TELEGRAPH, TELEPHONES, AND BLOCK SIGNALS."

"ON MANY RAILROADS, RADIO IS USED FOR COMMUNICATION BETWEEN MOVING TRAINS AND FIXED POINTS, AND FOR END TO END OF TRAINS, AND IN YARD SERVICE. MANY ROADS USE TWO-WAY, FREQUENCY MODULATION SPACE RADIO; OTHERS USE FIXED POINT TO TRAIN OR 'INDUCTIVE CARRIER' SYSTEM."

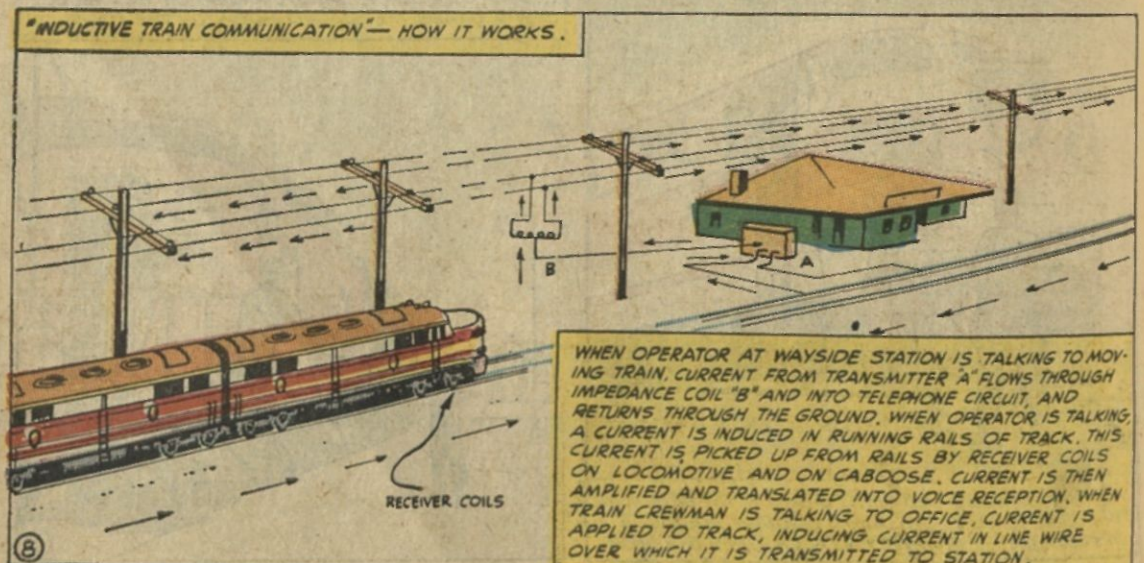
"ON THIS RAILROAD'S RADIO-EQUIPPED DIVISIONS, WE USE THE INDUCTIVE CARRIER SYSTEM FOR OVER-THE-ROAD OPERATIONS."

"ON SOME ROADS, SIGNAL INDICATIONS ARE REPEATED ON A PANEL INSIDE THE ENGINE CAB. THE SIGNALS, YOU KNOW, ARE GIVEN BY ELECTRIC CIRCUITS IN THE RAILS."

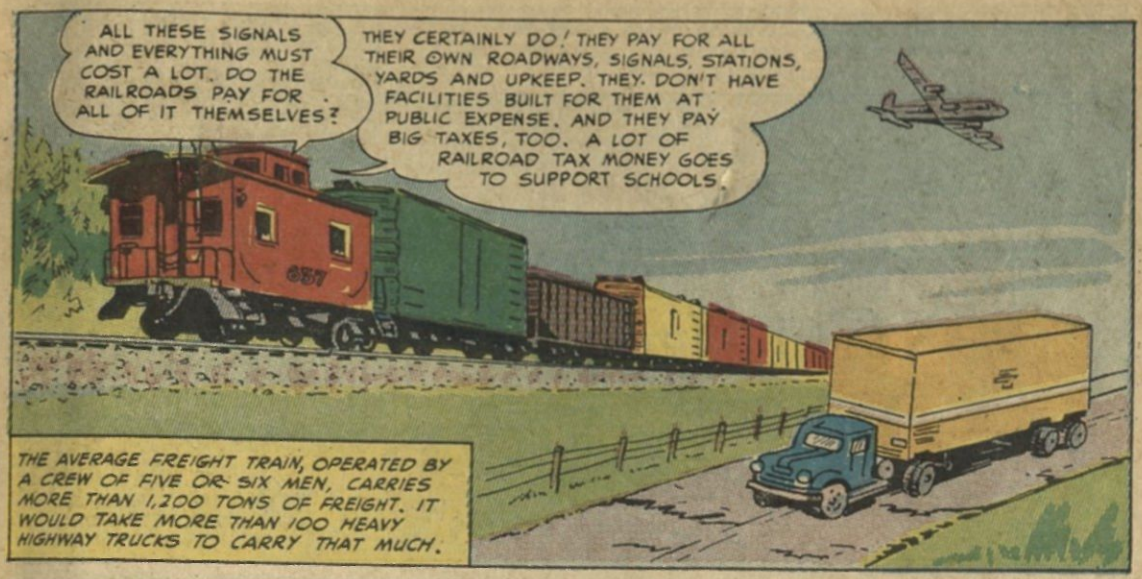


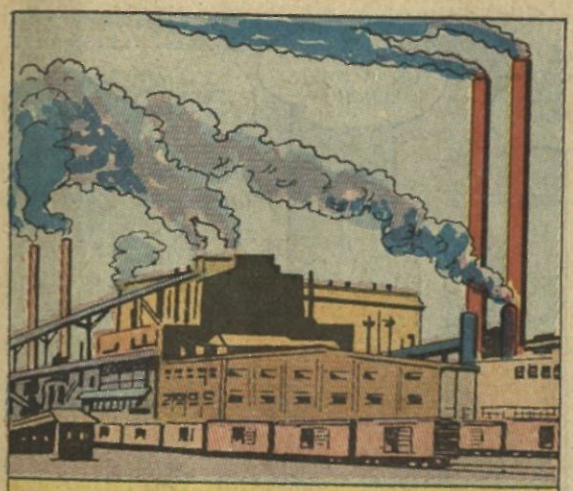

DAD, I KNOW A LITTLE ABOUT RADIO, BUT WHAT ABOUT THIS INDUCTIVE CARRIER SYSTEM?
IT USES THE RAILS, TOO, LIKE SIGNAL CIRCUITS, AND ALSO THE PARALLEL WIRE LINES. I'LL SHOW YOU A DIAGRAM.

"INDUCTIVE TRAIN COMMUNICATION" — HOW IT WORKS.

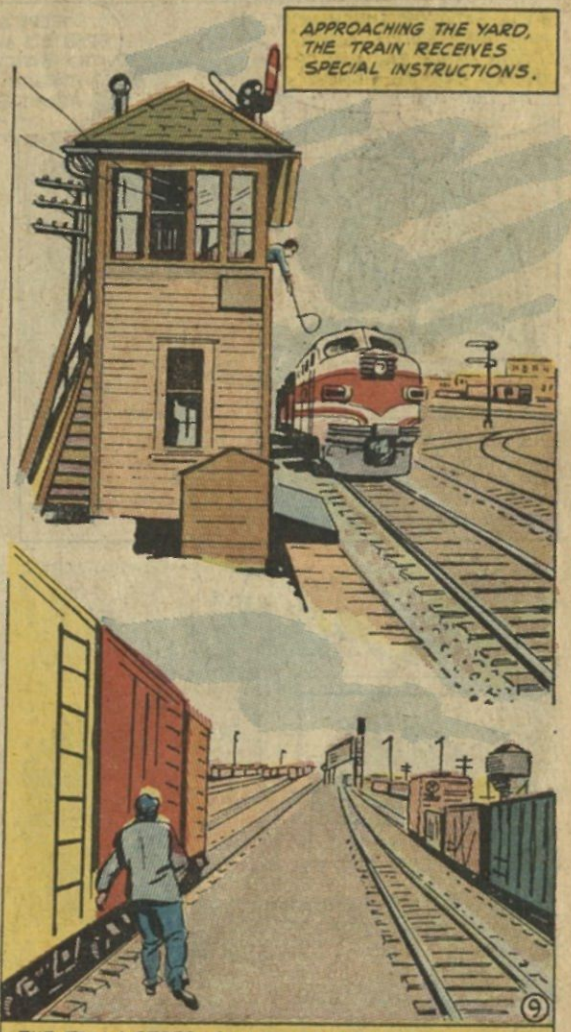


WHEN OPERATOR AT WAYSIDE STATION IS TALKING TO MOVING TRAIN, CURRENT FROM TRANSMITTER "A" FLOWS THROUGH IMPEDANCE COIL "B" AND INTO TELEPHONE CIRCUIT, AND RETURNS THROUGH THE GROUND. WHEN OPERATOR IS TALKING, A CURRENT IS INDUCED IN RUNNING RAILS OF TRACK. THIS CURRENT IS PICKED UP FROM RAILS BY RECEIVER COILS ON LOCOMOTIVE AND ON CABOOSE. CURRENT IS THEN AMPLIFIED AND TRANSLATED INTO VOICE RECEPTION. WHEN TRAIN CREWMAN IS TALKING TO OFFICE, CURRENT IS APPLIED TO TRACK, INDUCING CURRENT IN LINE WIRE OVER WHICH IT IS TRANSMITTED TO STATION.


ALL THESE SIGNALS AND EVERYTHING MUST COST A LOT. DO THE RAILROADS PAY FOR ALL OF IT THEMSELVES?
THEY CERTAINLY DO! THEY PAY FOR ALL THEIR OWN ROADWAYS, SIGNALS, STATIONS, YARDS AND UPKEEP. THEY DON'T HAVE FACILITIES BUILT FOR THEM AT PUBLIC EXPENSE. AND THEY PAY BIG TAXES, TOO. A LOT OF RAILROAD TAX MONEY GOES TO SUPPORT SCHOOLS.
THE AVERAGE FREIGHT TRAIN, OPERATED BY A CREW OF FIVE OR SIX MEN, CARRIES MORE THAN 1,200 TONS OF FREIGHT. IT WOULD TAKE MORE THAN 100 HEAVY HIGHWAY TRUCKS TO CARRY THAT MUCH.


AS No. 70 NEARS RIVERSIDE, FACTORIES AND FREIGHT SIDINGS INCREASE ALONG THE RIGHT-OF-WAY. FREIGHT CARS CARRYING RAW MATERIALS AND FUEL ARE BEING UNLOADED; OTHER CARS ARE BEING FILLED WITH MANUFACTURED GOODS.

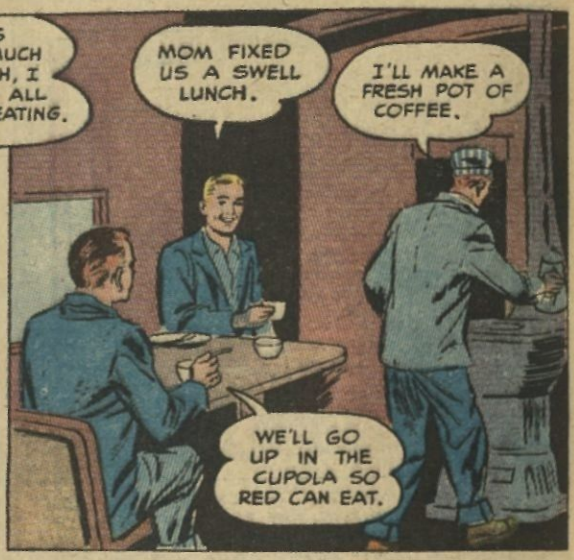
WHAT ARE WE GOING TO DO HERE IN RIVERSIDE?
ORDERS ARE TO SET OFF TEN CARS ON No. 9 TRACK. THEN WE'LL HIGHBALL AGAIN.
THE TRAIN SLOWS SPEED AND "DRIFTS" INTO RIVERSIDE, AN INTERCHANGE POINT WITH TWO OTHER RAILROADS, AND HEADS FOR THE YARDS ON THE OTHER SIDE OF THE CITY.


APPROACHING THE YARD, THE TRAIN RECEIVES SPECIAL INSTRUCTIONS.
THE TRAIN STOPS. A YARD BRAKEMAN CUTS OFF THE ENGINE AND FIRST TEN CARS. FIFTEEN MINUTES LATER No. 70 IS ROLLING DOWN THE MAINLINE AGAIN.

CONDUCTOR DAVIS SAYS, "LOOK OVER THERE, RANDY, WHERE THE WESTERN SUBDIVISION BRANCHES OFF THE MAINLINE. THAT'S ONE OF OUR DIESEL ROAD-SWITCHERS HAULING A LOCAL FREIGHT."

WE'LL EAT OUR LUNCH NOW, AND THEN RED'LL COME DOWN AND EAT HIS. I GUESS YOU'RE HUNGRY BY THIS TIME!
THERE'S BEEN SO MUCH TO WATCH, I FORGOT ALL ABOUT EATING.

AS No. 70 SPEEDS ON BEYOND THE SUBDIVISION JUNCTION, CONDUCTOR DAVIS "BOOKS" CARS PICKED UP EN ROUTE, RETURNS TO THE CUPOLA TO WATCH HIS TRAIN, CHECKS FREQUENTLY THE ORDERS PERTAINING TO ITS MOVEMENT.



THE FREIGHT ROARS THROUGH A TUNNEL...

...RIDES ACROSS A HIGH STEEL BRIDGE...

...PASSES THROUGH LITTLE VILLAGES, CLICKING OVER CROSSINGS...

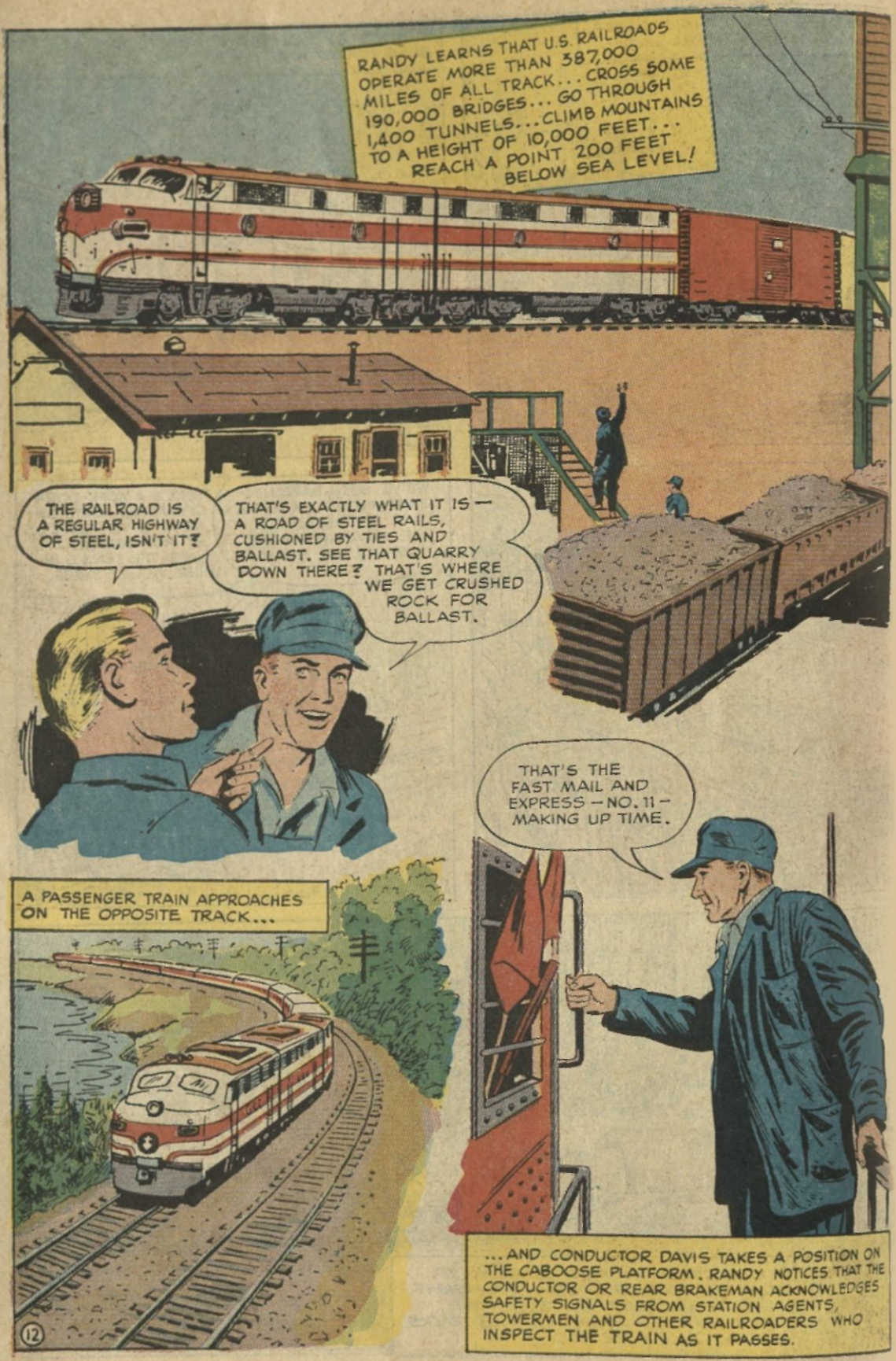
... GOES BY SIDETRACKS WHERE CARS ARE BEING LOADED WITH LUMBER AND PULPWOOD...

...MINE SIDINGS WITH LONG STRINGS OF COAL CARS.

WE'VE BEEN BARRELING RIGHT ALONG SINCE WE LEFT RIVERSIDE. DO WE HAVE ANY MORE STOPS OR MEETS?

THERE'S A WORK-EXTRA OPERATING NORTH OF US. IT'S TO CLEAR US AT IRON BRIDGE. I HOPE THE TRAIN'S IN WHEN WE GET THERE.

THE WORK-EXTRA IS ON THE SIDING WAITING FOR NO. 70 TO PASS. TRAIN CREWS IDENTIFY EACH OTHER AS THE FREIGHT ROLLS BY. WITH SPECIAL MACHINES AND EQUIPMENT, RAILROAD MAINTENANCE-OF-WAY WORKERS KEEP THE TRACKS SAFE AND STRONG ALL ALONG THE LINE.


RANDY LEARNS THAT U.S. RAILROADS OPERATE MORE THAN 387,000 MILES OF ALL TRACK... CROSS SOME 190,000 BRIDGES... GO THROUGH 1,400 TUNNELS... CLIMB MOUNTAINS TO A HEIGHT OF 10,000 FEET... REACH A POINT 200 FEET BELOW SEA LEVEL!
THE RAILROAD IS A REGULAR HIGHWAY OF STEEL, ISN'T IT?
THAT'S EXACTLY WHAT IT IS — A ROAD OF STEEL RAILS, CUSHIONED BY TIES AND BALLAST. SEE THAT QUARRY DOWN THERE? THAT'S WHERE WE GET CRUSHED ROCK FOR BALLAST.
A PASSENGER TRAIN APPROACHES ON THE OPPOSITE TRACK...
THAT'S THE FAST MAIL AND EXPRESS — NO. 11 — MAKING UP TIME.
...AND CONDUCTOR DAVIS TAKES A POSITION ON THE CABOOSE PLATFORM. RANDY NOTICES THAT THE CONDUCTOR OR REAR BRAKEMAN ACKNOWLEDGES SAFETY SIGNALS FROM STATION AGENTS, TOWERMEN AND OTHER RAILROADERS WHO INSPECT THE TRAIN AS IT PASSES.
12

TO THE PASSING TRAIN, MR. DAVIS SIGNALS THAT ALL IS WELL WITH ITS RUNNING GEAR; THE REAR BRAKEMAN OF THE OTHER TRAIN DOES THE SAME THING FOR HIM.

IN C.T.C. TERRITORY AGAIN, NO.70 PROCEEDS ON SIGNAL INDICATION OVER THE LAST 30 MILES OF THE RUN.

WHY ARE WE STOPPING HERE?

THEY'RE PUTTING US ON THE PASSING TRACK. THE DISPATCHER'S GOING TO HIGHBALL A SPECIAL BY US.

657

ADVANCED TO THE NEXT STATION, THE TRAIN SWITCHES FROM THE MAIN-LINE TO A PASSING TRACK.

A FEW MINUTES LATER, ANOTHER FREIGHT COMES HIGHBALLING UP THE MAIN. THE BIG, THREE-UNIT DIESEL ROARS BY...

212

... WITH CAR AFTER CAR OF MILITARY EQUIPMENT BEING RUSHED TO A PORT OF EMBARKATION — A LONG, HEAVY TRAIN SPEEDING MATERIALS FOR THE DEFENSE OF AMERICA.

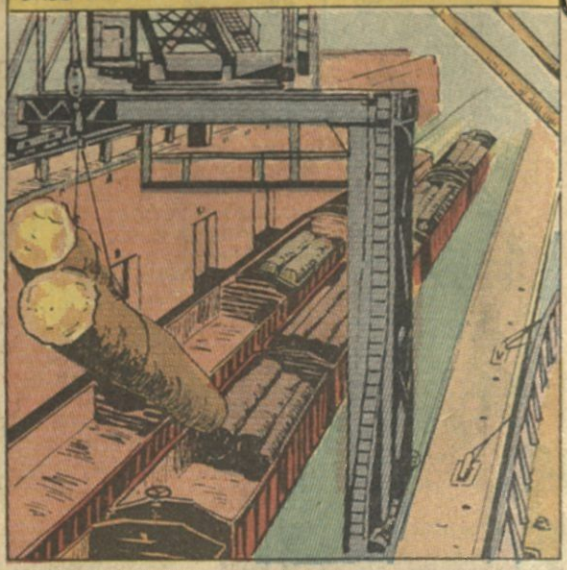
THERE ARE SOME OF THE CARS THAT WERE ON OUR TRAIN.

NO.70'S CREW HAS A ONE DAY LAY-OVER. THE NEXT MORNING, MR. DAVIS TAKES RANDY ON A TOUR OF THE TERMINAL AREA — FIRST TO THE FREIGHT STATION, WHERE FREIGHT IS BEING UNLOADED AND TRANSFERRED.

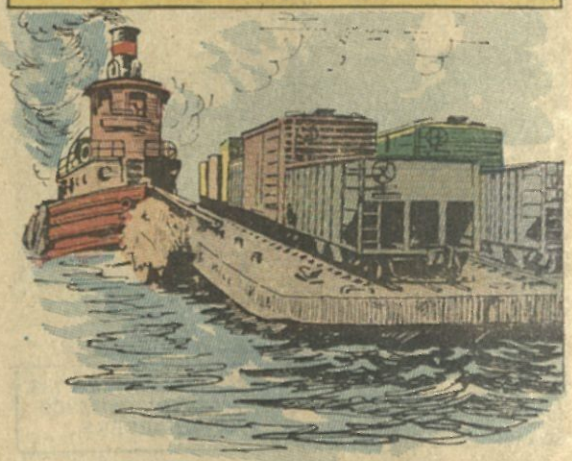
ROUNDHOUSE AND TURN-TABLE INTEREST RANDY.

HE SPENDS A FEW MINUTES WITH HIS UNCLE JOHN, A PASSENGER TRAIN ENGINEER.

AT TIDEWATER TERMINAL HE OBSERVES RAILROAD PORT FACILITIES — HUGE REVOLVING CRANES UNLOADING CARGO FROM SHIP TO CARS...



...AND LEARNS THAT AMERICAN RAILROADS OWN AND OPERATE MORE THAN 1,600 TUGS, CAR-FLOATS, FERRIES, LIGHTERS AND OTHER MARINE EQUIPMENT.



...COAL DUMPER AT WORK...

I'VE LEARNED ONE THING, DAD, FOR SURE — RAILROADS **REALLY DELIVER THE GOODS!** I CAN'T THINK OF ANYTHING WE BUY, WEAR, OR USE THAT HASN'T BEEN CARRIED BY TRAIN SOMEWHERE ALONG THE LINE.
AND IT WOULD BE HARD TO NAME ANY PRODUCT THAT ISN'T CHEAPER OR MORE PLENTIFUL BECAUSE OF RAIL TRANSPORTATION. THAT'S WHY FREIGHT TRAINS, QUITE AS MUCH AS PASSENGER TRAINS, PERFORM A PERSONAL SERVICE FOR YOU AND EVERY OTHER AMERICAN.

Each of the various means of transportation has its value and its use. But basic among them, and essential to the operation of all the others, is the train of cars on tracks.

There is nothing else in existence, and nothing in sight, which can do what the railroads do — every day — in moving the nation's freight.

That's why railroads are essential to our economy in time of peace — vital to our safety in time of war.

Produced by School and College Service. ASSOCIATION OF AMERICAN RAILROADS
TRANSPORTATION BUILDING, WASHINGTON 6, D. C.